Simulation 4 – Project Report

Submitted by:

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Description:

The objective of this project is to use our simulation model that we developed in project 3 to gain insights into the behavior of the system. Specifically, we will obtain curves of the 95th percentile of the end-to-end delay and of the probability that the server of the client queue (hereafter referred to as the client server) is idle as a function of the thresholds TL and TH. Based on these curves we will determine the best values of the thresholds TL and TH that minimize the 95th percentile of the end-to-end delay and at the same time the probability that the client server is idle is less or equal to 0.01

Technology Used:

The language used to code the simulation: C++. No external libraries are used and everything is made from scratch.

Algorithm:

- The code for the Simulation Project 3 remains intact.
- Modifications:
    - For each event it was checked if the client queue was idle.
    - If(idle){

        idleTime.push(make_pair(mcl , 0));

        else{

        idleTime.push(make_pair(mcl , 1));

        }
    - At the end it was divided into batches of given batch size.

o Probability was calculated for each batch.

o Then total mean of for all the batch's probabilities was calculated = P_{mean}.

Calculations:

- Values: N- 90000, DH- 1, DL- 2, Mean service time in the infinite server queue- 10, Mean service time in the client queue- 1.5
- Code was run for various different values for TL and TH.

Sr No.	TL	TH	Mean Probability	Mean Delay Time
1	1	2	0.00559707	13.2574
2	1	5	0.0028821	13.2573
3	1	8	0.00179843	13.2572
4	1	11	0.00125973	13.2572
5	1	14	0.000949269	13.2571
6	1	17	0.00075261	13.2571
7	4	5	0.000619515	13.2571
8	4	8	0.000524902	13.2571
9	4	11	0.00045504	13.2571
10	4	14	0.000401869	13.2571
11	4	17	0.000360389	13.2571
12	7	8	0.000327356	13.2571
13	7	11	0.000300589	13.2570
14	7	14	0.000278573	13.2570
15	7	17	0.000260231	13.2570
16	10	11	0.000244775	13.2570
17	10	14	0.000231621	13.2570
18	10	17	0.000220326	13.2569
19	13	14	0.000210551	13.2569
20	13	17	0.00020203	13.2570
21	16	17	0.000194555	13.2571

Graph:

The below graph shows trend for mean probability and mean delay time for different values of TL and TH.
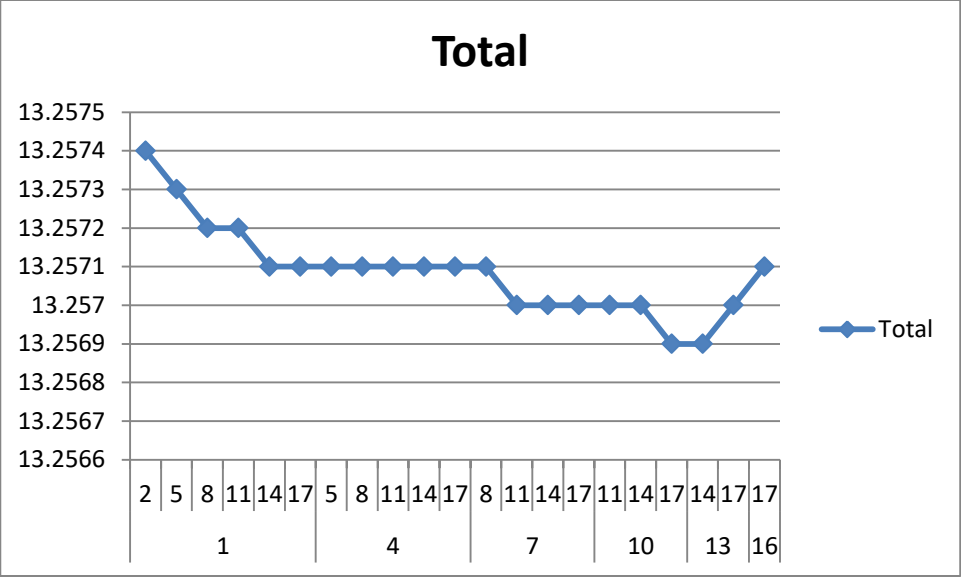
(Mean End to end Delay Time)
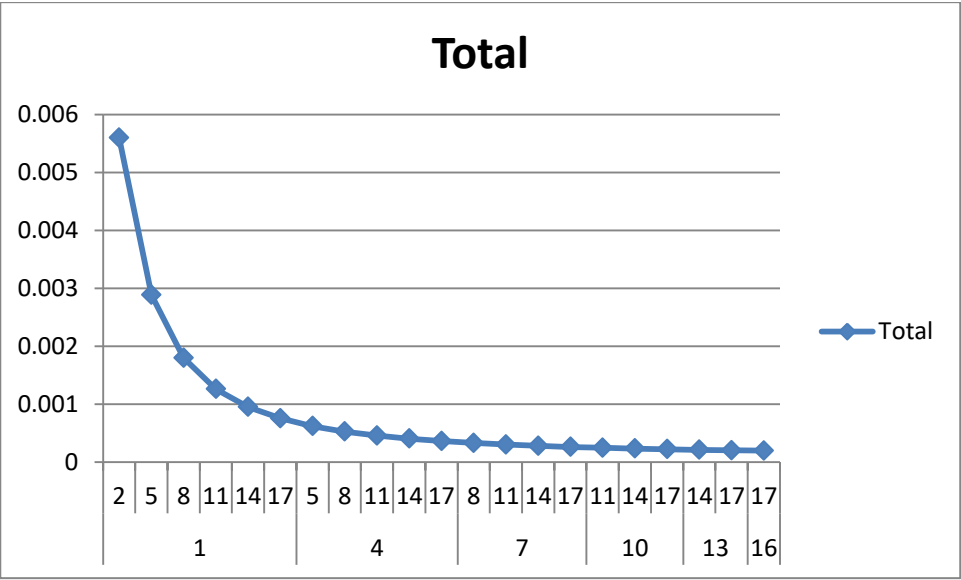
(Mean probabilities if client queue is idle)